



# CSIR NEWS

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## Seminar on Coastal Engineering

An all-India seminar on coastal engineering was held at the National Institute of Oceanography (NIO), Goa, on 24 & 25 March 1977. The first of its kind held in India the seminar gave an opportunity to marine scientists and coastal engineers from various organizations to meet and discuss their works. Prof. Per Bruun, Chairman, Port & Ocean Engineering Division, Technical University of Trondheim, Norway, inaugurated the seminar. Four special lectures and 61 scientific papers were presented during the six sessions of the seminar which was attended by 66 participants from 16 organizations.

The maximum number of papers (21) was from NIO followed by the Central Water & Power Research Station (20). Other organizations which participated in the seminar were : Andhra University, Waltair; Engineers India Ltd, New Delhi; Indian Institute of Technology; Pre-investment Survey of Fishing Harbours, Bangalore; Vikram Sarabhai Space Research Centre, Trivandrum; Ministry of Shipping and Transport, New Delhi; Naval Physical and Oceanographic Laboratory, Cochin; College of Engineering, Trivandrum; Central Design Organization; Irrigation and Power Development, Hyderabad; and DESLON Engineers, Panaji. Seven other organizations sent their representatives as observers.

At the first session on 'Waves, currents, tides and storm surges' nine papers, based on studies conducted on the east and west coasts of India, were

presented. The discussions highlighted the importance of the data on waves, currents and tides for coastal engineering works and the need for an efficient data service in the country.

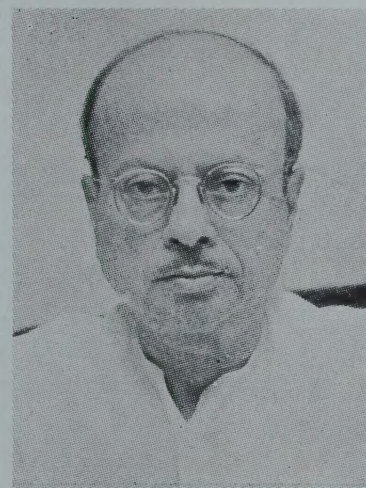
Seven papers presented at the session on 'Estuarine and harbour engineering', were concerned with port development, siltation, breakwater design, dredging, sand bar formation, design of offshore oil terminals, and control of oil spills.

Another major problem along the coastline is erosion of beaches. The third session on 'Coastal erosion and protective measures' included eight papers. This session was followed by a special lecture by Prof. Bruun on the history and philosophy of coastal protection.

Some papers gave specific examples of erosion and accretion occurring in the beaches of India. A few papers highlighted the different methods used at present for the protection of beaches in different parts of the world, such as groins, floating breakwaters, and sea walls. Since the protection of beaches was a cost-intensive operation, it was finally agreed by the participants that the best method of protection of a beach was that which needed minimum expenditure.

The fifth session on 'Modelling techniques' was devoted to the use of models, their needs and their limitations. Eleven papers presented at this session dealt with the specific uses of modelling techniques in the estuarine work, layout of ports, harbours, marine structures, design of groins, movement

## New Vice President, CSIR



Dr P.C. Chunder, Union Minister for Education, has been nominated Vice President, CSIR, in place of Shri P.N. Haksar, with effect from 1 June 1977

of silt, wave conditions, and coastal dynamics.

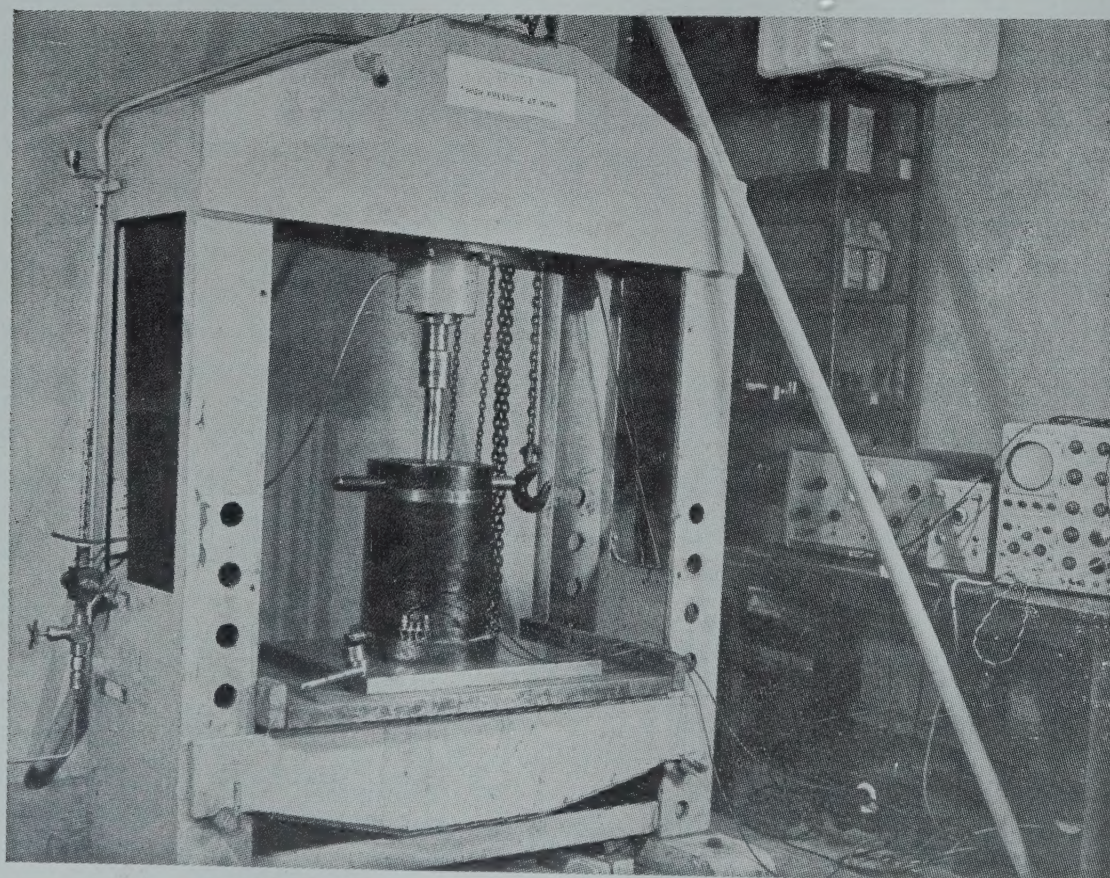
The last session was concerned with a variety of problems relating to coastal engineering. Seventeen papers were presented at this session, and these covered oil-metabolizing bacteria—Foraminifera, potential of tidal power in India, power from wind waves, submarine pipe-line surveys, sewage outfalls in the sea, effect of tidal flow on marine structures and several other related subjects.

The seminar, which gave an excellent coverage of a variety of coastal engineering problems facing the Indian coastline, was a noteworthy attempt to discuss the problems of mutual interest to marine scientists and coastal engineers for the overall development of the coastal zone in India.



## High-Pressure Cell for Production of Hydrostatic Pressures

A high-pressure cell for the production of hydrostatic pressures of the order of 70,000 to 80,000 psi has been developed at the National Geophysical Research Institute (NGRI), Hyderabad. The equipment, developed by Dr Y. V. Ramana and covered by Indian Pat. 137542, relates to an experimental arrangement for the production of hydrostatic pressure for carrying out controlled pressure tests on rock samples. It is a closed cylindrical cell of the monoblock type working on the principle of a single piston, single plunger assembly with a rigid bottom closure and a fluid as the pressure medium. The cell is safe to work a routine cell pressure of 5 kb. The fluid pressure is generated by working a suitable hydraulic jack. The cell has a cylindrical working space of 1.75 in. diam. and 5-7 in. length and is ideal for the study of both single crystal materials or polycrystalline aggregates and other solid materials of 1-1½ in. diam.



The 5 kb high-pressure cell developed at NGRI, Hyderabad

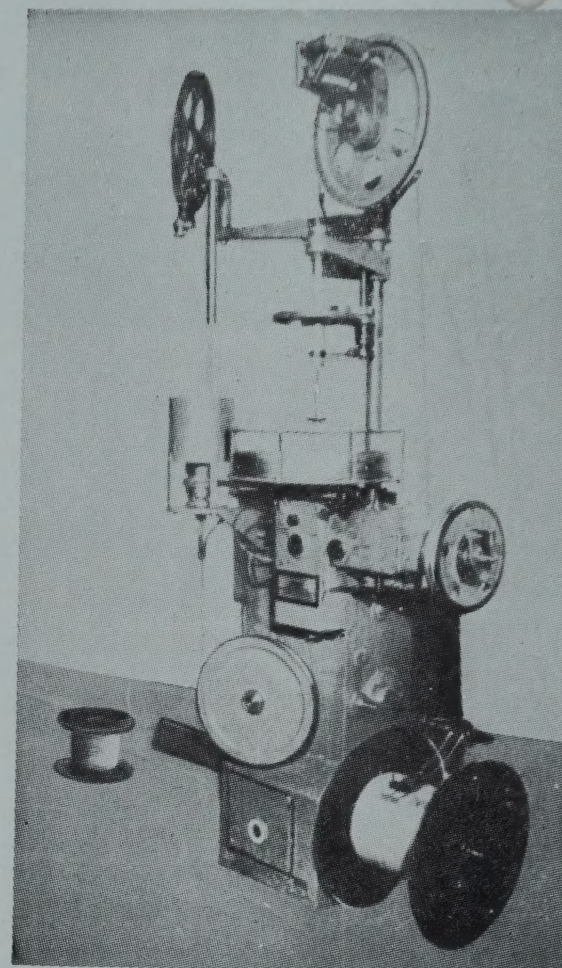
With suitable changes, the cell could be used for simultaneous production of high pressure and temperature (of the order of 300°C). The accuracy of the device is  $\pm 30$  bars.

## CMERI Develops High-Speed Paper-Lapping Machine

On the recommendation of the National Committee on Science & Technology, the Central Mechanical Engineering Research Institute (CMERI), Durgapur, has designed and developed a high-speed paper-lapping machine for telecommunication cables in collaboration with Hindustan Cables Ltd (HCL), Rupnarayanpur. At present, these machines are being imported at a cost of about Rs 95,000 per machine.

A special feature of the machine designed by CMERI is that it can insulate the paper tape and string either together or separately by merely attaching the paper string assembly to the paper-lapping machine.

The specifications of the paper-lapping machine developed at CMERI are :



High-speed paper-lapping machine developed at CMERI, Durgapur

Conductor size	: 0.4-1.3 mm copper wire
Speeds of paper-lapping head	: 2250, 2500, 2750 and 3000 rpm
Max. speed of string spindle	: 6000 rpm
Paper pad dimensions	: ID—50 mm, OD—300 mm (max.)
Width	: 6-13 mm
Drive motor	: one TEFC sq cage induction motor 1.5/2 hp at 1500/3000 rpm, 400/440 V, 3-phase, 50 c/s.

Different capstans provided give 45, 52 and 60 wraps per metre corresponding to lays of 22, 19 and 17. The production rate per machine is 20 km of conductor in 8 working hours. One skilled operator can handle five machines at a time.

Guest Keen William Ltd (GKW) and Noakhali Machine Tools Ltd (NMT), Calcutta, were selected for the fabrication of two prototypes each and for commercial production of the machine after the prototypes were tested. Regular inspection was made



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by CMERI scientists and HCL technicians during the course of fabrication. After the prototypes were made at GKW, they were tested rigorously at HCL and necessary modifications were suggested and implemented. GKW have since supplied eight more machines to HCL which have been very successfully working. NMT have also fabricated two prototypes and tests on their make are in progress.

The cost of this indigenous machine is Rs 62,700, which is less than two-thirds of the price of the imported one.

### Rotary Staking Machine

Staking in the finished leather industry is an important operation after the leathers are dyed, fatliquored and dried. Staking should be done properly to give appropriate flexing to the leather, at the same time stretching the leather without making it saggy. Several machines like jaw type slocomb, vibration staking and vertical staker are available in the market. These machines are imported at a very high cost. It was observed that these machines were not giving the uniform properties for different types of lea-

thers. Particularly in the case of vibration staking machine the staking operation is repeated by using the slocomb jaw staker, for certain types of leather. These observations led the Central Leather Research Institute (CLRI), Madras, to develop indigenously suitable staking machines. CLRI has started designing rotary staking machines with the financial sponsorship of Guest Keen Williams Ltd, Calcutta. In this machine, some improved systems are added after testing the prototype, thus making the machine an asset to the tanneries. This improvement can save foreign exchange worth several lakhs of rupees. The machine has the combined effect of vibration staking and slocomb staker and saves duplication of staking operation. It also increases the area without sagging on the leather.

The leather, placed between two rubber rollers, is processed first between the spreading roller and a rubber roller. Then it passes over the staking blade. The feed roller, spreading roller and the staking blade can be adjusted individually for suitable staking action of various types of leathers. Adjustments for thickness variations are

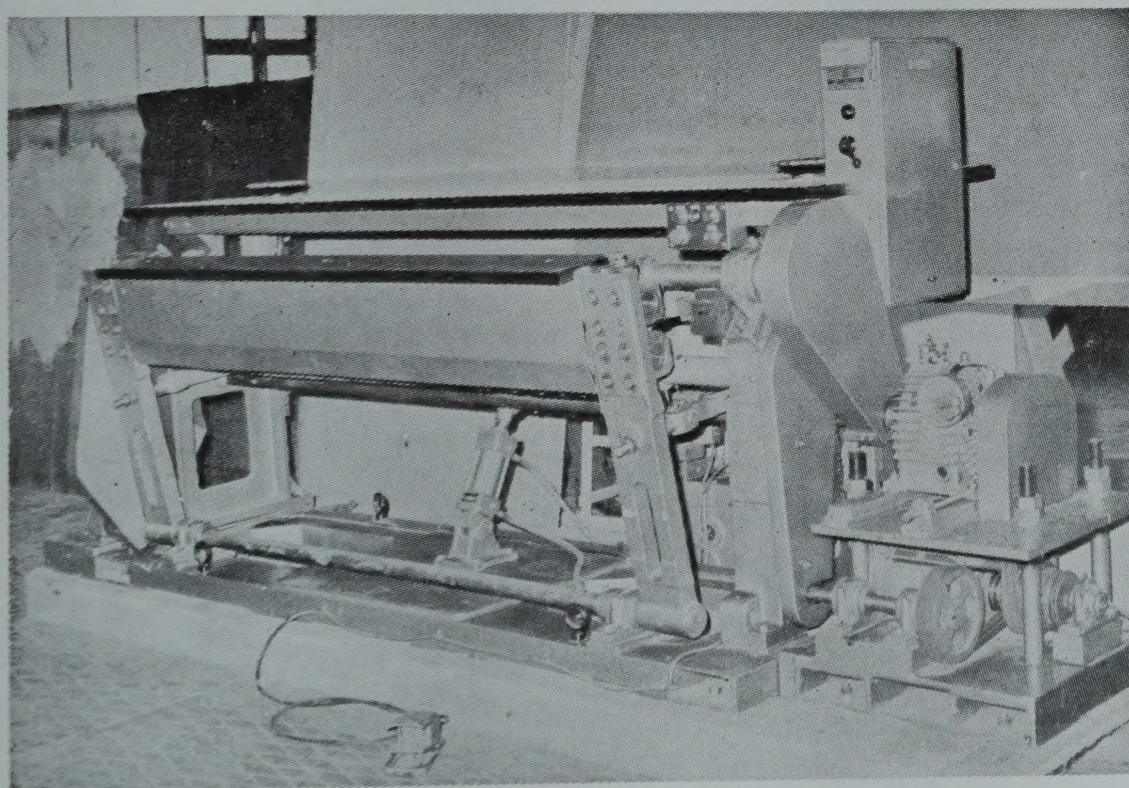
obtained by limiting movement of the feed roller which is carried between two swing arms. These arms are pushed by means of a hydraulic cylinder towards the spreading roller and the staking blade.

The use of hydraulics ensures a positive lock-up of the roller to the spreading roller and the staking blade, thereby maintaining a consistent action of staking. An infinitely variable speed between 70 and 140 rpm is achieved and this in turn provides a smooth, infinitely variable feed speed which can be perfectly matched to the type of leather to be staked. The machine is incorporated with an electromagnetic clutch so that the rotation of the feed roller is started when the swing arms have nearly closed in.

### X-ray Study of Thermal Expansion and Phase Transformation in Some Semiconductor Chalcogenide Materials

Studies on the characterization of thermal expansion and phase changes on heating or air oxidation of semiconductor chalcogenide materials such as  $\text{In}_2\text{O}_3$ ,  $\beta\text{-In}_2\text{S}_3$ ,  $\text{Bi}_2\text{Te}_3$  and  $\text{Bi}_2\text{SeTe}_2$  were carried out at the National Physical Laboratory (NPL), New Delhi, by Shri K. D. Kundra under the guidance of Dr (Mrs) S. Z. Ali of the laboratory. These materials find applications in coatings on glass for solar devices, photoconductive devices, thermo-electric generation and refrigeration, etc. The materials were prepared by heating stoichiometric amounts of spec pure elements in an evacuated, sealed quartz capsule. To get a stoichiometric composition, a thorough mixing in the liquid state was ensured by heating the capsule in a specially designed rocking furnace.

High-temperature X-ray diffraction studies on  $\text{In}_2\text{O}_3$  powders indicated no phase change or dissociation of the compound in vacuum in the temperature range 30-968°C. Thermal expansion coefficient constants  $\alpha$  and  $\beta$  were obtained by fitting the data in the



Rotary staking machine developed at CLRI, Madras



expression  $a_T = a(1 + \alpha T + \beta T^2)$  by least squares method. These results were examined in relation to dilatometric data of Weiher and Lay.

High-temperature X-ray studies on  $\beta$ - $\text{In}_2\text{S}_3$  in the temperature range 30-975°C revealed a reversible phase change between 750° and 800°C by the appearance of new X-ray diffraction lines. The reversible  $\beta \rightleftharpoons \gamma$  phase change involved a transformation of tetragonal to hexagonal structure confirmed by 3-fold symmetry obtained on a Laue photograph of  $\beta$ - $\text{In}_2\text{S}_3$  single crystal at 800°C. A considerable shrinkage ( $\sim 2.1\%$ ) along  $c$ -axis, observed during phase transformation, was explained and understood precisely on the basis of enhanced mobility of tetrahedral indiums and vacancies in terms of existing corrugations in the close-packed planes of sulphur atoms of the spinel cube of  $\beta$ - $\text{In}_2\text{S}_3$ . A reasonable agreement between the calculated and observed intensities of the powder lines of the  $\gamma$ -phase gave added evidence to the structure of the  $\gamma$ -phase (space group  $P\bar{3}m1$ ,  $Z_{\text{In}} = 0.81$ ) with all the indiums in octahedral coordination between sulphur atom layers with sequence  $-(\text{S}-\text{In}-\text{S}-\text{In}-\text{S})-$ .

The hexagonal  $a$  and  $c$  lattice parameters of  $\text{Bi}_2\text{SeTe}_2$  for the stoichiometric composition were determined ( $a = 4.3034 \pm 0.0003 \text{ \AA}$ ,  $c = 29.996 \pm 0.002 \text{ \AA}$ ) with higher precision than hitherto reported in literature. A supplementary evidence to the composition was obtained from a good agreement between observed and calculated densities of the material. Thermal expansion coefficients were determined at temperatures ranging from 25° to 525°C, and anisotropy observed in thermal expansion was found similar to that by Francombe on  $\text{Bi}_2\text{Te}_3$ , although no anomaly in the coefficients of expansion was observed in the present studies.

Air oxidation of  $\text{Bi}_2\text{Te}_3$  and  $\text{Bi}_2\text{SeTe}_2$  was carried out in the temperature range 145-825°C. The weight changes during oxidation and the chemical analyses by X-ray fluorescence studies

had suggested the chemical formulae for the two stable oxidized phases of  $\text{Bi}_2\text{Te}_3$  and  $\text{Bi}_2\text{SeTe}_2$  as  $\text{Bi}_2\text{Te}_3\text{O}_{8.5-9.0}$  and  $\text{Bi}_2\text{Te}_2\text{O}_7$  respectively. The X-ray powder patterns of the stable oxidized phases were indexible on tetragonal ( $a = 3.90 \text{ \AA}$ ,  $c = 11.36 \text{ \AA}$ ) and orthorhombic ( $a = 5.53 \text{ \AA}$ ,  $b = 5.50 \text{ \AA}$ ,  $c = 11.41 \text{ \AA}$ ) cells respectively for the two compositions mentioned above. The above two unit cells are closely related, and further comparison of the above results with available powder data on other compounds of  $\text{Bi}_2\text{O}_3$ - $\text{TeO}_2$  systems indicated that the Bi-O-Te ternary system is characterized by closely similar structures.

Shri Kundra was awarded the Ph. D. degree of the University of Delhi for his thesis based on these studies.

### Crystal Structure and Thermal Expansion of InSe

Interest in the semiconductor chalcogenide materials in the In-Se system has recently increased because of their possible technical applications in temperature and switching devices, photoconductors in the ultraviolet, visible and near-infrared regions, semiconductor lasers, etc. The crystallographic data available in the case of the above selenides in general and InSe (the compound under study) in particular are not consistent as regards the space group, cell dimensions, atomic parameters and the powder spacings. In view of the above discrepancies it was necessary to clarify the ambiguities in the structural parameters before the device potentialities and other electrophysical properties of the compound InSe were studied. Investigations relating to the crystal structure characterization of InSe were undertaken by Shri K. C. Nagpal at the National Physical Laboratory, New Delhi, under the guidance of Dr (Mrs) S. Z. Ali of the laboratory. Also studied were the nature of extended defects and thermal behaviour of InSe.

After a number of trials the conditions of preparation were standardized and it was found that only a certain rate of the cooling of the melt, enclosed

in an evacuated quartz capsule in a rocking furnace, yielded ingots of uniform composition having good shining surfaces and layered structure.

The complete powder pattern, so far not available in literature, consisting of indexed spacings with relative intensities up to the highest Bragg angles was obtained in addition to the data on the products obtained after various periods of annealing powder as well as single crystals in vacuum at about 590°C.

With the indexing of Weissenberg photographs of crystals it has been concluded that InSe lattice is rhombohedral. The In and Se atoms are in  $3(a)$  positions of the space group  $R\bar{3}m$  with

$$Z_{\text{In}} = \pm 0.0555, Z_{\text{Se}} = 2/3 \pm 0.1060$$

These values are very close to the actual positions as the discrepancy factor  $R$  is 6.4%. The atomic sequence was found to be  $-(\text{Se}-\text{In}-\text{In}-\text{Se})-$ , with three such packets along the  $c$ -axis in the ABC stacking.

Crystals grown by the fusion method as described above had, in the majority of cases, very thin lamellae parallel to the basal planes with random change over orientation of the rhombohedral cell giving the observed set of diffuse  $hk.l$  reflections (with  $h - k \neq 3n$ ). In a comparatively few cases, composite crystal formation was observed such that the obverse-reverse orientations exist side by side in adjacent regions of the platy crystal. The powder patterns of the former type were indexed in the early stages of this work on a hexagonal cell with  $a_0 = 4.0046 \text{ \AA}$ ,  $c_0 = 16.640 \text{ \AA}$ , whereas for the latter the indexing was done on a rhombohedral cell with  $a = 4.0046 \text{ \AA}$ ,  $c_0 = 24.960 \text{ \AA}$ . A very few rare crystals were found to have reflections due to a single orientation only.

InSe did not undergo any phase transformation involving relative atomic displacements in the temperature range 25-435°C. However, compositional change due to loss of one or both components at high temperatures under certain conditions gave rise to other phases in the In-Se system.



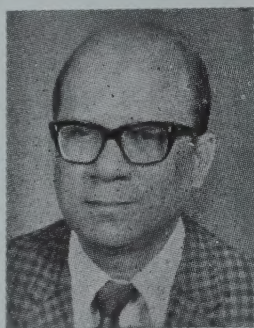
The thermal expansion coefficient along the  $a$ -axis at  $50^{\circ}\text{C}$  was found to be  $10.5 \times 10^{-6}$  as compared to  $24.4 \times 10^{-6}$  for the coefficient along  $c$ -axis but the two became roughly equal ( $\sim 12 \times 10^{-6}$ ) in the temperature range  $150\text{--}450^{\circ}\text{C}$ .

For his thesis based on these studies Shri Nagpal was awarded the Ph. D. degree of the University of Delhi.

## POWER SYSTEM PLANNING AND CONTROL

Bhatnagar Prize-winner Prof. Pai's Work

Prof. M. A. Pai's principal research contributions concern the application of computer-based techniques to problems of power system planning and control. In integrated power system operation, the problems of concern are those pertaining to stability, security and control. Stability of a power-system has to be ensured at the planning level, years in advance, and then continuously monitored during system operation. Methods based on repeated computer simulation are inefficient and time-consuming. The direct method based on Lyapunov's technique yields information about system stability much faster. Pai's extensive contribution in this area includes systematic generation of Lyapunov function, extension to large-scale systems through the concept of vector Lyapunov function and, more recently, providing the theoretical foundation for fast computation of stability region, inclusion of transfer conductances, etc. In the area of power system security and control, Pai and his research



Prof. M. A. Pai

Prof. M. A. Pai of the Department of Electrical Engineering, Indian Institute of Technology, Kanpur, has been awarded the Shanti Swarup Bhatnagar prize in engineering sciences for the year 1974 (jointly with Prof. R. Narasimha) [CSIR News, 27 (1977), 57].

workers have proposed a unified approach to this twin problem based on sensitivity considerations, and the fast algorithms so derived are suitable for on-line implementation. With the emergence of regional power grids in India, these techniques are bound to find applications.

Pai started his research career at the University of California at Berkeley in digital control systems. At the Indian Institute of Technology (IIT), Kanpur, he has built up a research group specializing in computer-aided power system simulation and control. Electricity boards in India are increasingly becoming aware of the potentialities of the computer in solving their problems both at the planning and operational level. Besides organizing a number of courses for them, Pai has assisted organizations like the Bharat Heavy Electricals Ltd (BHEL) and the Uttar Pradesh State Electricity Board (UPSEB) in setting up computer study cells in their organizations. UPSEB is one of the few electricity boards in the country which have developed in-house expertise for carrying out sophisticated system studies.

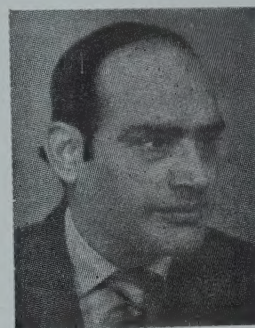
The planning and operation of regional and national grid requires analytical techniques which can handle systems of large sizes and not limited by available core-limited computers. Pai and his coworkers have used Kron's Diakoptics technique not only for analysis of such large systems, but for their optimization as well. They have also proposed a multi-level approach to the optimization problem. Another research area pioneered in this country by Pai has been the optimal control of nuclear reactors. In the event of disturbances in the grid the control of the nuclear reactor has to be such as to minimize the effect of the disturbance. Extensive modelling, simulation and development of control strategies for both PWR and BWR reactors have been made at IIT, Kanpur.

Prof. Pai is also the author of a book, 'Introduction to Electric Circuits and Machines' (East-West Press, 1975).

## TECHNOLOGY OF THIN FILMS

Bhatnagar Prize-winner Prof. Chopra's Work

The physics of thin films deals with the study of the process of *ab initio* creation of matter by condensing atoms/molecules in the form of two-dimensional layers or films and the understanding of their physical and chemical properties. The related technology utilizes phenomena peculiar to thin films for devices applications. Prof. Chopra and his research group have established a research



Prof. K. L. Chopra

school of international standing and eminence in the area of solid state physics and technology of thin films in the last six years. The school has contributed extensively to the various aspects of this exciting field of research.

Prof. Chopra has made outstanding contributions towards the understanding of the structure and growth of polycrystalline, epitaxial and amorphous films of a variety of materials. The effect of electric field and ultrasound on the nucleation and growth of films was discovered by him. He has established stabilizing conditions of a large number of new and unusual structures in a variety of metals, alloys and semiconducting compounds, and has enunciated rules for the occurrence of such structures in thin films. As a result of these studies, new thin-film materials of considerable importance in optics and superconductivity are likely to be made available in future.

The modern aspects of the understanding of the electron transport properties of metal films is based largely on the work of Chopra and coworkers. Systematic studies of the

Prof. K. L. Chopra of the Department of Physics, Indian Institute of Technology, New Delhi, has been awarded the Shanti Swarup Bhatnagar prize in physical sciences for the year 1975 (jointly with Prof. B. R. Nag) [CSIR News, 27 (1977), 57].



size effects in various transport and thermal properties, and of the anomalously large effect of vacancies, dislocations and impurities on the electron transport behaviour have brought about considerable rethinking in the field. As a result, it is now possible, for example, to understand the opposite signs of the Hall coefficient and thermoelectric power of noble metals. Also, the work has led to the separation of structural, electronic, spatial and spin disorder effects on the transport properties of metal films.

Chopra and his group have developed a solution growth technique for growing polymer films with controlled orientation of chains. The technique has been used successfully to incorporate large concentrations (as high as 40 wt %) of a number of metals (e. g. Cu, Ni, Cd, Co) in polymers. The kinetics of growth of such films has been characterized electronmicroscopically. The electrical and optical properties of these metallopolymer films suggest a wide variety of applications as transparent conducting coatings, optical image storage and polarizers. By suitable doping and stretching, thin-film polarizers of commercial quality have been produced.

Optical coatings of variable optical properties and spatially varying optical constants have been developed, studied and utilized as optical devices. As a result of these studies it is possible to obtain optical materials of desired optical constants in any spatial gradient so that the designing of sophisticated optical coatings for active and passive integrated optical devices becomes much easier.

Chopra and his group have conducted pioneering work on amorphous materials, particularly semiconductors and metal alloys, since 1966. The group continues to be the leader in this field and has done extensive studies on the structural, electrical and optical properties of several tetrahedrally coordinated semiconductors and metal alloys. These studies have given a clearer understanding of the electronic energy-band diagram of amorphous semicon-

ductors and have correlated large changes in this diagram with the microstructural changes in amorphous films. These studies have also made it possible to produce new amorphous materials with predictable and variable physical properties, such as conductivity, thermopower, optical gap, and optical constants.

A novel solution growth technique has been developed to prepare films of mixed alloy semiconductors. Variable composition films of  $\text{Pb}_x\text{Hg}_{1-x}\text{S}$  of optical gap ranging from about 0.2 to 1.2 eV have been prepared and studied. The films have been used as infrared detectors of high sensitivity in a portable hot-spot remote sensor. An infrared vidicon is being fabricated using these films.

An intensive photovoltaic and solar-thermal conversion programme is being conducted by Chopra and his group. A new technique has been developed to prepare thin-film  $\text{CdS}/\text{Cu}_2\text{S}$  solar cells by both evaporation and chemical spray methods. By converting  $\text{CdS}$  into  $\text{Cu}_2\text{S}$  by a solid state reaction with  $\text{CuCl}$ , and then by depositing  $\text{CdS}$  for the formation of a heterojunction, solar cells of  $\sim 4\%$  efficiency and high stability (negligible deterioration in the first six months) have been produced. The technique may be a major breakthrough in the area.

Selective coatings of metallic oxides, metallopolymer, black chrome and nickel, and suitable semiconductors are currently being characterized for solar-thermal conversion applications.

Prof. Chopra has been a consultant to a number of small-scale industries involved in the manufacture of vacuum components and thin-film electronic and optical devices. Chopra and his research group have developed indigenously more than 15 thin-film and vacuum technology processes, devices or instruments of considerable interest to Indian industry both from the point of view of innovations and import substitution. These include: thin-film  $\text{CdS}$  photocells, electronmicroscope grids and apertures, dye and interference filters, ophthalmic glass coat-

ings, bent-beam electron gun, ultra-high vacuum system, infrared detector, hot-spot remote sensor, thermopile, polaroids, step-and-repeat camera, and solar cells. The first six of these have been taken over by a few small-scale industries for commercial exploitation.

### Deputation Briefs

Under the India-USA Exchange of Scientists Programme, Dr B. Singh of the Central Mining Research Station (CMRS), Dhanbad, was deputed to USA from 15 January to 19 February 1977. Dr Singh visited the U.S. Bureau of Mines (USBM) head office at Washington and the four research centres of USBM at Pittsburgh, Denver, Twin Cities and Spokane. He also visited two mines and the research laboratories at Pennsylvania State University, University of Minnesota, Colorado School of Mines, University of Utah, University of Missouri, Virginia Polytechnic Institute, Henry Crumb School of Mines (New York), and Massachusetts Institute of Technology. In most of these places Dr Singh delivered lectures on strata control. He also explored the possibilities of collaboration in the field of research on mining problems.

Being impressed by CMRS approaches to various problems, a number of organizations have expressed willingness to enter into such collaboration. CMRS approaches are mainly based on underground data and model study. On the other hand, USA has made tremendous progress on computer modelling. It is hoped that interaction between these two approaches would benefit both the countries.

### PROGRESS REPORTS

#### CIMPO Report : 1973-75

The Central Indian Medicinal Plants Organisation (CIMPO), Lucknow, has brought out a report which covers the research and allied activities of the organization during 1973-75. These activities, carried out at its headquarters in Lucknow, Regional Centres in



Haldwani, Bangalore and Jammu & Kashmir, and Drug Farms & Factories in Jammu & Kashmir, have been grouped in five sections.

*Mentha citrata*, a source of linalool and linalyl acetate, has been introduced at CIMPO headquarters. Investigations carried out at Lucknow have shown that the plant grows very well there. When planted in January it gives three crops a year. The oil contents of the whole fresh herbs of May, August and October harvests were found to be 0.63, 0.58 and 0.72%, respectively. The oil contains 83-90% of total alcohol as linalool and 48-55% of esters as linalyl acetate. A yield of 50 kg of oil per acre per annum has been obtained with a return of Rs 4500. Linalool and linalyl acetate are used in perfume, cosmetic, soap and flavour industries.

Experimental trials of *Dioscorea prazeri* and *D. floribunda*, sources of diosgenin, were undertaken. Recognition of the authenticity of *Cymbopogon* species by TLC and GLC was achieved. A process was developed for making bigger crystals of menthol.

Cultivation of ergot was started at Haldwani. Ergot is a valuable source of important alkaloids like ergotamine and ergometrine which are used during child birth and for treatment of migraine. An alkaloid content of 0.64% with more than 60% of ergotamine obtained from the crop in Tarai region shows that the region is quite suitable for production of pharmaceutical-grade ergot.

A new species of *Ocimum* with 77% of methyl chavicol as the main constituent and 13% of linalool was also introduced at the Haldwani Centre. It is an economical crop giving a gross income of Rs 9000/ha. The centre produced materials worth Rs 1.60 lakh and Rs 1.63 lakh during 1973-74 and 1974-75 respectively.

Fertilizer trials on Citronella Java carried out at the Bangalore Regional Centre gave encouraging results. It has been possible to get 400 kg of oil per hectare annually. Annual yield of flowers of jasmine was found to be 7500 kg/ha from the second year on-

wards, and this is higher than the amount obtained in Morocco, Italy and France. A new coriander strain has been evolved by a process of repeated selections from Bulgarian Coriander. It has been possible to obtain 2.2 tonnes of seed per hectare with an oil content of 1.5% as compared to the yield of 700 kg of seeds with an oil content of 0.3% from the local variety. *Vinca rosea* has been introduced at the Bangalore Centre and yields of 1632 kg of air-dried roots and 4000 kg of air-dried leaves per hectare per annum have been obtained.

The Drug Farms and Factories in Jammu & Kashmir made a profit of Rs 6.25 lakh during 1973-74 and of Rs 8.35 lakh during 1974-75. Major items of production were ergot, belladonna, pyrethrum and diosgenin.

A research and demonstration centre has been set up at Gehru on Lucknow-Kanpur Road for taking up cultivation of medicinal and aromatic plants on alkaline soils. It was decided to set up a centre at Kodaikanal for cultivation of pyrethrum, geranium and other medicinal and aromatic plants.

Publication of a quarterly bulletin, *CIMPO Newsletter*, was started in January 1974. A farm bulletin on 'Oil of Citronella Java' was brought out for the use of growers.

## PERSONNEL NEWS

### Shri T. S. Rajagopalan

Shri T. S. Rajagopalan of the Indian National Scientific Documentation Centre (Insdoc), New Delhi, took over as Scientist-in-charge of Insdoc (1 Jan. 1977).

#### Appointments/Promotions

The following personnel of the National Geophysical Research Institute (NGRI), Hyderabad, have been promoted as Scientist B: Shri D. V. Subba Rao (from Scientist A, 25 Feb. 1977); Dr G. S. Mithal (from Scientist A, 25 Feb. 1977); Shri S. Venkatachalam (from Scientist A, 25 Feb. 1977); Dr B. S. Rathor (from Scientist

A, 19 Feb. 1977); and Shri V. P. Dimri (from SSA, 23 Feb. 1977).

The following have been appointed Scientist B at NGRI: Mrs K. Yesodhara Devi (21 March 1977); Miss Mysore Kousalya (14 April 1977); and Dr Umesh Chandra Das (6 April 1977).

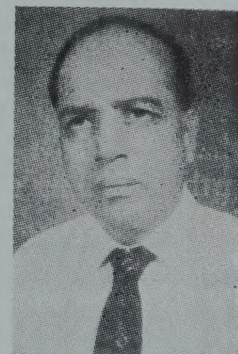
#### Transfers

Shri R. T. Otiv, Section Officer, Central Salt and Marine Chemicals Research Institute, Bhavnagar, has been transferred to the National Chemical Laboratory (NCL), Poona; Shri Otiv took charge as Section Officer at NCL on 9 May 1977.

### Shri S. Parthasarathy

Shri S. Parthasarathy, Scientist-in-charge, Indian National Scientific Documentation Centre (Insdoc), New Delhi, retired on 30 April 1977.

Born on 23 August 1917 at Pondicherry, Shri Seringapatam Parthasarathy had his education at the Madras, Delhi and Chicago universities. As a close associate of the late Dr S. R. Ranganathan, he took deep interest in the theoretical study of library science in the early part of his career. He joined the Delhi University Library



in 1949 and was also engaged in teaching library science. Shri Parthasarathy joined Insdoc in 1952, the year of its establishment. Over the years Shri Parthasarathy has played a pivotal role in the planning and organization of Insdoc at successive stages of its development to make it a model national documentation centre.

Several organizations, both at home and abroad, have been seeking the expert advice and guidance of Shri Parthasarathy in the field of information services. He has been the chairman of the Documentation Sectional Committee of the Indian Standards Institution since 1974. He also served on the



committees of the University Grants Commission, Indian Council of Social Science Research, Ministry of Education, Department of Science and Technology, Indian National Science Academy, etc. in the field of library and information science. He has been largely responsible for piloting the National Information System for Science and Technology for India. He has rendered yeoman's service in developing the information infrastructure in the country by helping to develop information systems in many sectors such as small industries, patents, iron and steel, metallurgy, and aeronautics.

Shri Parthasarathy has been in the forefront of library and information science education for a quarter of a century. He was associated with the teaching programmes in this field at the Madras and Delhi universities besides those of Insdoc and the Documentation Research and Training Centre, Bangalore. He was on the editorial boards of *Insdoc List of Current Scientific Literature*, *Bibliography of Scientific Publications of South and South-east Asia*, *Indian Science Abstracts* and *Annals of Library Science and Documentation*. He has to his credit more than 35 erudite papers in documentation and allied fields.

Shri Parthasarathy has been intimately associated with the International Federation for Documentation (FID) as a member of its Council as co-chairman of the Committee on Classification Research (FID/CR), and as a member of the Committee on Developing Countries (FID/DC) and of the Commission for Asia and Oceania (FID/CAO). He has been a Vice President of the International Advisory Committee of Unesco on Documentation, Libraries and Archives (IACODLA) and a member of the UNISIST Steering Committee. He has been a consultant to the World Intellectual Property Organisation (WIPO). He was invited to the first Ottawa Conference of the Conceptual Basis of the Classification on Knowledge (1971). He was responsible for

conducting a regional training course in scientific documentation for Middle East in Cairo (1963). He had also served as an expert to advise the Industrial Development Centre for Arab States, Cairo, in 1971. He was a member of the Indian delegation which visited USSR in 1974 and of the delegation to EEC (1975) to study and observe the working of the information systems of these countries.

Shri Parthasarathy's services are being availed of, as Honorary Professor, by DRTC, Bangalore.

### ATIRA Hari Om Ashram Awards 1977

The Hari Om Ashram Trust, Nadiad, has instituted at the Ahmedabad Textile Industry's Research Association (ATIRA), Ahmedabad, an award known as 'Hari Om Ashram Prerit Ranchhodlal Chhotlal C. I. E. Research Award Endowment'. Towards this end the Ashram has donated a sum of Rs 50,000 to ATIRA. The award will be given every year to scientists/technologists for outstanding scientific or technological contribution in India in various fields of textile sciences. A board of trustees and an expert committee have been constituted for administering the award.

The following types of scientific contribution in various fields of textile sciences will be considered for the award: (1) Scientific/technical achievement in textile technology, textile chemistry, synthesis of dyestuffs, and fibre science, and designing of textile machinery; (2) Solution of short-term critical problems facing the textile industry; (3) Process/product development of commercial value to the Indian textile industry (product would include machinery and instruments); and (4) Outstanding contribution towards the scientific understanding of important phenomena in textile manufacture.

Technologists/scientists working in textile and allied industries are invited to send entries for this award. Application forms, to be filled in sets of five

copies, will be available from the Director, Ahmedabad Textile Industry's Research Association, Post Polytechnic, Ahmedabad 380015. The last date for the receipt of entries is 31 October 1977.

Further enquiries concerning this award may also be addressed to the Director of ATIRA.

## COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

### Advertisement No. 16/77

It is proposed to appoint a Scientist F for the Indian Institute of Experimental Medicine, Calcutta.

**Job Requirements :** This is a senior research management position and the incumbent will be required to provide high-level leadership to formulate plan and guide research and developmental activities in the chemistry of natural products, identify technological problems and offer assistance in the transfer of technology and developmental activities to concerned organizations. He may also be required to assist the Director in planning and execution of sponsored projects and in such other matters as may be assigned to him.

**Qualifications :** Essential—High academic qualifications in organic chemistry/medicinal chemistry, preferably doctorate degree with extensive experience of research in the chemistry of natural products, and with impressive record of published work.

**Salary/Conditions of Service :** The salary scale attached to the post is Rs 2000-125/2-2500. Initial pay will be fixed according to merit. The person selected will be appointed on contract for a period of six years, and the contract would be confirmed after an initial period of two years of satisfactory service. Other conditions of contract will be supplied on request.

**Age Limit :** Below 50 years, relaxable in special cases.

Scientists interested may obtain standard proforma for sending their *curriculum vitae* from the Chief (Administration), Council of Scientific and Industrial Research, Rafi Marg, New Delhi 110001. They can also obtain a brochure on the aims and objects and latest annual report of the institute. Completed *curriculum vitae* proforma will be received in this office on or before 27 July 1977.

Canvassing in any form and/or bringing in any influence, political or otherwise, will be treated as disqualification for the post.